

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION**

FOTONATION LIMITED and
DIGITALOPTICS CORP. MEMS,

Plaintiffs,

v.

SAMSUNG ELECTRONICS CO., LTD.,
AND SAMSUNG ELECTRONICS
AMERICA, INC.

Defendants.

No. 2:17-cv-00669-RWS

JURY TRIAL DEMANDED

THIRD AMENDED COMPLAINT

Plaintiffs FotoNation Limited and DigitalOptics Corporation MEMS (collectively, “FotoNation” or “Plaintiff”) bring this patent infringement action against Defendants Samsung Electronics Co., Ltd. (“SEC”) and Samsung Electronics America, Inc. (“SEA”) (collectively, “Samsung”) as follows:

NATURE OF THE ACTION

1. This is a civil action for infringement of U.S. Patent No. 8,254,674 (“’674 patent”), U.S. Patent No. 8,331,715 (“’715 patent”), U.S. Patent No. 7,860,274 (“’274 patent”), U.S. Patent No. 7,697,829 (“’829 patent”), U.S. Patent No. 7,574,016 (“’016 patent”), U.S. Patent No. 7,620,218 (“’218 patent”), U.S. Patent No. 7,916,897 (“’897 patent”), and U.S. Patent No. 8,908,932 (“’932 patent”) (collectively, “Asserted Patents”) under the patent laws of the United States, 35 U.S.C. § 1 *et seq.*

THE PARTIES

2. Plaintiff FotoNation Limited is a company organized and existing under the laws of Ireland with its principal place of business located at Cliona, Building One Parkmore, East Business Park Ballybrit, Galway, Ireland H91R2E9.

3. Plaintiff DigitalOptics Corporation MEMS is a Delaware Corporation with its principal place of business located at 3025 Orchard Parkway, San Jose, CA 95134.

4. Defendant SEC is a company organized under the laws of the Republic of Korea with its principal place of business located at 129 Samsung-ro, Maetan-3dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742 Korea.

5. Defendant SEA is a New York Corporation with its principal place of business at 85 Challenger Road, Ridgefield Park, New Jersey 07660. SEA is a wholly-owned subsidiary of SEC. SEA's registered agent, The Corporation Trust Company, is located at Corporation Trust Center, 111 Eighth Avenue, New York, New York 10011.

JURISDICTION AND VENUE

6. This action involves claims arising under the patent laws of the United States, 35 U.S.C. § 1 *et seq.*

7. The Court has subject matter jurisdiction over these claims under 28 U.S.C. §§ 1331 and 1338(a) and the patent laws of the United States, 35 U.S.C. § 1 *et seq.*

8. The Court has personal jurisdiction over each of the Defendants consistent with the requirements of the Due Process Clause of the United States Constitution and the Texas Long Arm Statute. On information and belief, each Defendant has regularly and systematically transacted business in Texas, directly or through subsidiaries or intermediaries, and/or committed acts of patent infringement in Texas as alleged more particularly below. Defendants have also

placed infringing products into the stream of commerce by shipping those products into Texas or knowing that the products would be shipped into Texas. In addition, SEA's business operations relating to cell phones, which are among the devices accused of infringement in this Action, are conducted primarily at its Texas facilities and (as of February 2015) over 2,000 people were employed at SEA's Texas facilities.

9. With respect to Defendant SEC, a Korean company, venue is proper because suits against foreign entities are proper in any judicial district.

10. With respect to Defendant SEA, venue is proper in this district under 28 U.S.C. § 1400(b) because Defendant SEA has a regular and established place of business in this district and has committed acts of infringement in this district. Defendant SEA has a permanent office located at 1301 East Lookout Drive, Richardson, Texas 75082, which is located in Collin County and within this district. Defendant SEA also employs full-time personnel, such as engineers and senior managers in this district, including in Richardson, Texas. On information and belief, Samsung's business operations relating to cellular mobile devices are conducted primarily at its facilities located in Richardson. Defendant SEA has also committed acts of infringement in this district by commercializing, marketing, selling, distributing, and servicing certain Samsung-branded devices, including but not limited to phones and tablets, which are devices Plaintiffs accuse of infringement in this Action.

FOTONATION'S HISTORY OF INNOVATION

11. FotoNation was founded in 1997 and focused significant early research efforts on the problem of removing red-eye onboard a digital still camera. This problem was difficult to solve because digital still cameras had limited processor and battery resources available to devote to the complex task of identifying and removing red-eye.

12. FotoNation developed a software product that could operate on a digital still camera to detect and reduce red-eye. FotoNation's significant research efforts resulted in several innovations—including partial face detection, use of subsampling, and use of filter chains—that allowed its software product to deliver strong performance in the resource-constrained environment of a digital still camera.

13. In 2004, FotoNation's product was the first red-eye reduction technology running on an embedded device: the Nikon CP5400. The industry rapidly moved to adopt FotoNation's superior technology and, by 2007, nine out of ten Tier 1 digital still cameras sold were shipped with FotoNation's product on board.

14. FotoNation's red-eye technology received several awards and was recognized as innovative in numerous publications.

15. FotoNation also devoted significant research efforts to solving the problem of how to track an object (such as a face) within a camera's preview image stream. This problem was difficult because the complex task of continuously determining the position of a potentially moving object could not easily be performed with the limited processor and battery resources of a digital still camera or a smartphone.

16. FotoNation developed a product capable of tracking faces within the image preview stream of a digital still camera or smartphone. This product solved the problem of tracking a face on a portable device through several advances—including using weighted averages—that allowed for superior performance while consuming minimal resources.

17. In 2009, Samsung started using FotoNation's software for face tracking in its products. The smartphone industry widely adopted FotoNation's face tracking software. By

2015, FotoNation was the high-end smartphone market leader, with its product included in 60% of high-end smartphones sold.

18. FotoNation's face tracking software has received praise within the industry and in a number of publications.

THE ASSERTED PATENTS

19. The '674 patent is entitled "Analyzing Partial Face Regions for Red-Eye Detection in Acquired Digital Images" and issued on August 28, 2012, to inventors Florin Nanu, Stefan Petrescu, Mihnea Gangea, Adrian Capata, Mihai Ciuc, Adrian Zamfir, Eran Steinberg, Peter Corcoran, Alexei Pososin, Petronel Bigioi, and Alexandru Drimbarean. FotoNation Limited owns the entire right, title, and interest in and to the '674 patent.

20. The '715 patent is entitled "Digital Image Processing Using Face Detection Information" and issued on December 11, 2012, to inventors Eran Steinberg, Yury Prilutsky, Peter Corcoran, and Petronel Bigioi. FotoNation Limited owns the entire right, title, and interest in and to the '715 patent.

21. The '274 patent is entitled "Digital Image Processing Using Face Detection Information" and issued on December 28, 2010, to inventors Eran Steinberg, Yury Prilutsky, Peter Corcoran, and Petronel Bigioi. FotoNation Limited owns the entire right, title, and interest in and to the '274 patent.

22. The '829 patent is entitled "Electronic Damping for Stage Positioning" and issued on April 13, 2010, to inventors Roman C. Gutierrez, Roberto J. Rodriguez, and Pat K. Leang. DigitalOptics Corporation MEMS owns the entire right, title, and interest in and to the '829 patent.

23. The '016 patent is entitled “Digital Image Processing Using Face Detection Information” and issued on August 11, 2009, to inventors Eran Steinberg, Yury Prilutsky, Peter Corcoran, and Petronel Bigioi. FotoNation Limited owns the entire right, title, and interest in and to the '016 patent.

24. The '218 patent is entitled “Real-Time Face Tracking with Reference Images” and issued on November 17, 2009, to inventors Eran Steinberg, Petronel Bigioi, Peter Corcoran, Alexei Pososin, Alexandru Drimbarean, Florin Nanu, and Stefan Petrescu. FotoNation Limited owns the entire right, title, and interest in and to the '218 patent.

25. The '897 patent is entitled “Face Tracking for Controlling Imaging Parameters” and issued on March 29, 2011, to inventors Peter Corcoran, Eran Steinberg, and Petronel Bigioi. FotoNation Limited owns the entire right, title, and interest in and to the '897 patent.

26. The '932 patent is entitled “Digital Image Processing Using Face Detection and Skin Tone Information” and issued on December 9, 2014, to inventors Peter Corcoran, Igor Barcovschi, Eran Steinberg, Yury Prilutsky, and Petronel Bigioi. FotoNation Limited owns the entire right, title, and interest in and to the '932 patent.

CLAIMS FOR PATENT INFRINGEMENT

27. The allegations provided below are exemplary and without prejudice to Plaintiffs' infringement contentions provided pursuant to the Court's scheduling order and local rules. In providing these allegations, Plaintiffs do not convey or imply any particular claim constructions or the precise scope of the claims. Plaintiffs' claim construction contentions regarding the meaning and scope of the claim terms will be provided under the Court's scheduling order and local rules.

28. The accused products include, but are not limited to, red-eye detection software and associated hardware, face detection software and associated hardware, beauty face software and associated hardware, camera software and associated hardware, and camera module hardware and associated software for zoom and/or autofocus for the Samsung Galaxy S6, Galaxy S7, Galaxy S8, Galaxy Note 8, Samsung Galaxy Note 5, Samsung Galaxy S8+, Samsung Galaxy S7 Edge, Samsung Galaxy S7 Active, Samsung Galaxy S6 Edge, Samsung Galaxy S6 Active, Samsung Galaxy J3 Emerge, Samsung Galaxy J3, Samsung Galaxy J7, Galaxy Tab A, Samsung Galaxy Tab A With Pen, Samsung Galaxy Tab Pro S, Samsung Galaxy Tab S3, Samsung Galaxy Tab S2, Samsung Galaxy Tab E, Samsung Galaxy Tab E Nook, Samsung Galaxy Tab E Lite, Samsung Kids – Powered by Galaxy Tab E Lite, and the Samsung Galaxy View and all products with similar functionality relevant to each of the Asserted Patents. As detailed below, each element of at least one claim of the Asserted Patents is literally present in the accused products. To the extent that any element is not literally present, each such element is present under the doctrine of equivalents.

COUNT I
INFRINGEMENT OF THE '674 PATENT

29. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 20 as though fully set forth herein.

30. Samsung has infringed and continues to infringe one or more claims of the '674 patent, directly or indirectly, literally or under the doctrine of equivalents, by making, using, selling, and/or offering to sell in the United States and importing into the United States without authority at least the red-eye detection software and associated hardware for the Samsung Galaxy S8, Samsung Galaxy S8+, Samsung Galaxy S7, Samsung Galaxy S7 Edge, Samsung Galaxy S7 Active, Samsung Galaxy S6, Samsung Galaxy S6 Edge, Samsung Galaxy S6 Active, Samsung

Galaxy Note 8, Samsung Galaxy Note 5, Samsung Galaxy Tab S2, Samsung Galaxy Tab S3, Samsung Galaxy TabPro S, Samsung Galaxy Tab E, Samsung Galaxy Tab A, Samsung Galaxy Tab A With S Pen, and Samsung Galaxy View , and cell phones and tablet products with similar relevant functionality (collectively, “’674 Accused Products”).

31. For example, Samsung has directly infringed and continues to directly infringe claim 29 of the ’674 patent and other claims that depend from claim 29, literally or under the doctrine of equivalents, by using in the United States without authority the ’674 Accused Products.

32. The ’674 Accused Products constitute a “portable processor-based device” specifically programmed as claimed. For example, each Galaxy S8 contains a processor that is programmed as described below.

33. The ’674 Accused Products contain “an image acquisition component including a lens and an image sensor for capturing digital images.” For example, the ’674 Accused Products contain front cameras, rear cameras, or both, each of these cameras containing a lens and an image sensor.

34. The ’674 Accused Products contain “one or more processor-readable media” in which digital code is embedded that programs the processor as described below. For example, the ’674 Accused Products contain flash memory storage.

35. The ’674 Accused Products “perform red-eye detection in an acquired digital image.” For example, the ’674 Accused Products include a camera module and a Camera application that acquire digital images. They additionally include a Gallery application that contains a “Red Eye” feature that detects red-eye in an image.

36. The '674 Accused Products contain digital code configured to program the “processor” to “acquir[e] a first image.” For example, the '674 Accused Products include a camera module and a Camera application that acquire digital images.

37. On information and belief, the '674 Accused Products contain digital code configured to program the “processor” to “analyz[e] one or more partial face regions within the first image.” For example, when an image including a face or partial face is loaded in the Gallery application of a '674 Accused Product, a yellow circle surrounds the face.

38. On information and belief, the '674 Accused Products contain digital code configured to program the “processor” to “determin[e] one or more characteristics of the first image.” For example, when a user selects the “Red Eye” option in the Gallery application of the '674 Accused Products, the application determines the location of the eyes in the image, as demonstrated by the two white circles it displays in those locations.

39. On information and belief, the '674 Accused Products contain digital code configured to program the “processor” to “identify[] one or more corrective processes including red-eye correction that can be beneficially applied to said first image according to said one or more characteristics.” For example, when a user in the Gallery application selects a white circle indicating the location of an eye in an image, the Gallery application removes any red-eye defect from that region of the image, indicating that it has determined one or more corrective processes including red-eye correction.

40. On information and belief, the '674 Accused Products contain digital code configured to program the “processor” to “apply[] said one or more corrective processes to said first image.” For example, when a user in the Gallery application selects a white circle

indicating the location of an eye in an image, the Gallery application removes any red-eye defect from that region of the image.

41. The '674 patent recites improved technology for performing red-eye detection and removal by detecting and evaluating partial face regions. *E.g.*, '674 patent at 22:31-49, 35:40-36:53. Prior art systems were deficient because they depended on detecting a full-face image—which required significant processing power and time, and could not be used unless a full face is visible. *See, e.g., id.* at 22:38-49, 23:34-40. The '674 patent solves those problems and others by, among other things, providing for a system that applies a specific type of red-eye removal and “analyze[s] one or more partial face regions.” *E.g., id.* at 4:9-14. The dependent claims further describe using “sub-sampl[ing],” red-eye filter “chains,” “pixel locating and segmentation; shape analysis; falsing analysis; or pixel modification,” and other details.

42. Conventional systems for red-eye removal were unable to analyze a partial face and remove red-eye. In particular, these conventional systems required full face detection and evaluation, which was processor-intensive, time-consuming, and not always feasible. The claimed invention of the '674 patent improved on computer and digital-processing technology by, among other things, providing for detection and evaluation of a partial face. This detection and evaluation of a partial face allowed for removing red-eye from a partially occluded face and permitted less resource-intensive face detection by decreasing the size of the region to be detected.

43. The dependent claims of the '674 patent further require details that improve the functioning of the red-eye removal system, including sub-sampling, red-eye filter chains, pixel locating and segmentation, shape analysis, falsing analysis, and pixel modification. Sub-sampling, for example, may decrease the amount of data required to represent a given area in an

image, thus generally decreasing processing requirements. Red-eye filter chains and pixel locating and segmenting, for example, can make more efficient and effective use of processing resources by eliminating unnecessary computations. Shape analysis and falsing analysis, for example, allow for a potential red-eye region to be confirmed or rejected through computationally efficient rules, increasing the performance and accuracy of a red-eye removal system.

44. In each claim, the claimed elements in combination are unconventional for the additional reason that they form a system that makes technical improvements to the process of analyzing a partial face and removing red-eye. Red-eye can occur only in eyes looking directly into the camera. The eyes of a partial face may look directly into the camera. The eyes of other views of faces that are not partial faces—such as a face in profile—cannot look directly into the camera and cannot result in red-eye. Thus not only is detection of a partial face unconventional; the combination of red-eye and partial-face detection is further unconventional because partial faces may exhibit red-eye in a way that other views of faces—such as a face in profile—cannot. In each claim, the claimed elements in combination are unconventional, improve computer and digital processing technology, and solve problems in that field, producing better quality images.

45. By at least July 13, 2015, FotoNation provided Samsung a presentation entitled “face patents overview” that detailed some of the various technologies included in its patent portfolio, including an explicit identification of “Red-Eye Filter” as a technology that “60+ patents” in its portfolio addressed. On April 11, 2016, FotoNation also explicitly named the ’674 patent to Samsung and provided a description of the general subject matter of the ’674 patent and examples of relevant Samsung products or components that are believed to be using the ’674 patent based on information FotoNation had obtained independently of Samsung. Thus, based

on FotoNation's disclosure of the '674 patent to Samsung and the fact that discussions regarding the '674 patent occurred, Samsung has had knowledge of the '674 patent and that its activities infringe the '674 patent, should have known of these facts, and/or willfully blinded itself to these facts since at least July 13, 2015. Additionally, based on FotoNation's disclosures to Samsung and the fact that discussions regarding the '674 patent occurred, by at least July 13, 2015, Samsung has also known, should have known, and/or willfully blinded itself to the fact that its customers, distributors, importers, and other purchasers and users of the '674 Accused Products are infringing the '674 patent.

46. Samsung also actively, knowingly, and intentionally induces infringement of one or more claims of the '674 patent under 35 U.S.C. § 271(b) by actively encouraging others to sell, import, and use '674 Accused Products, or products containing infringing components in the '674 Accused Products, in this judicial district and elsewhere in the United States. Additionally, Samsung actively, knowingly, and intentionally induces infringement of one or more claims of the '674 patent under 35 U.S.C. § 271(b) by actively encouraging others, including but not limited to the resellers, purchasers, or users of the '674 Accused Products, to use the red-eye detection and correction features of the '674 Accused Products in a way that directly infringes one or more claims of the '674 patent. For example, Samsung actively promotes the use of its red-eye detection software and associated hardware in the infringing cell phones and tablets, and specifically promotes the use of infringing red-eye detection and correction features of the '674 Accused Products, in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.samsung.com, specifically at <http://www.samsung.com/global/galaxy/galaxy-s8/camera/> (last visited Sept. 26, 2017)), press releases (such as the press release available at news.samsung.com/global/in-depth-look-fast-fun-

and-in-focus-the-galaxy-s8-camera (Mar. 30, 2017)), and user manuals, as well as at trade shows (e.g., CES and Mobile World Congress) and through its sales and distribution channels that encourage infringing uses, sales, offers for sale, and importation of the '674 Accused Products or products containing infringing components, and specifically encourages uses of the red-eye detection and correction features of the Accused Products by others, including users or purchasers of the '674 Accused Products, in a way that directly infringes the '674 patent.

47. Samsung further actively, knowingly, and intentionally contributorily infringes one or more claims of the '674 patent under 35 U.S.C. § 271(c) by knowingly making, selling, and/or offering to sell in the United States, and/or importing into the United States the '674 Accused Products that contain components that are especially made or especially adapted for use in infringing the claims of the '674 patent and that are not a staple article or commodity of commerce suitable for substantial non-infringing use, in violation of 35 U.S.C. § 271(c). For example, the '674 Accused Products include red-eye detection software and associated hardware that are especially adapted for use in infringing the claims of the '674 patent that are not suitable for substantial non-infringing use. Others, including resellers, users, or purchasers of the '674 Accused Products, use, sell, or import red-eye detection and correction systems containing the '674 Accused Products in a way that directly infringes the '674 patent.

48. By at least April 11, 2016, FotoNation explicitly named the '674 patent to Samsung and provided a description of the general subject matter of the '674 patent and examples of relevant Samsung products or components that are believed to be using the '674 patent. By at least April 20, 2016, FotoNation also provided Samsung presentations that detailed the technologies claimed in the '674 patent and identified at least some of Samsung's products (such as the Samsung Galaxy Note 4, S6, and S6 Edge) and activities that infringed the '674

patent. Based on FotoNation's disclosure of the '674 patent to Samsung and the fact that discussions regarding the '674 patent occurred, Samsung was therefore notified of its infringement by at least April 11, 2016, and continued to infringe thereafter.

49. Based solely on FotoNation's own information and independent investigation without reliance on any information provided by Samsung, Samsung has continued to use the '674 Accused Products in the United States and/or indirectly infringe the '674 patent in the United States despite its knowledge of the '674 patent, its infringement of that patent, and its customers' infringement of that patent. Samsung's direct and indirect infringement has been and continues to be willful.

50. Plaintiff has suffered and continues to suffer damages as a result of Samsung's infringement of the '674 patent.

COUNT II
INFRINGEMENT OF THE '715 PATENT

51. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 38 as though fully set forth herein.

52. Samsung has infringed and continues to infringe one or more claims of the '715 patent, directly or indirectly, literally or under the doctrine of equivalents, by making, using, selling, and/or offering to sell in the United States and importing into the United States without authority at least the face detection software and hardware and associated software and hardware for the Samsung Galaxy S8, Samsung Galaxy S8+, Samsung Galaxy S7, Samsung Galaxy S7 Edge, Samsung Galaxy S7 Active, Samsung Galaxy S6, Samsung Galaxy S6 Edge, Samsung Galaxy S6 Active, Samsung Galaxy J3, Samsung Galaxy J3 Emerge, Samsung Galaxy Note 8, Samsung Galaxy Note 5, Samsung Galaxy Tab S2, Samsung Galaxy Tab S3, Samsung Galaxy TabPro S, Samsung Galaxy Tab E, Samsung Galaxy Tab A, and Samsung Galaxy Tab A With S

Pen, and cell phones and tablet products with similar relevant functionality (collectively, “’715 Accused Products”).

53. For example, Samsung has directly infringed and continues to directly infringe claim 1 of the ’715 patent and other claims that depend from claim 1, literally or under the doctrine of equivalents, by using in the United States without authority at least the ’715 Accused Products.

54. Each ’715 Accused Product is “a digital acquisition device with an adjustable optical system having an auto focusing mechanism.” For example, each ’715 Accused Product is used with a camera module with an adjustable lens. Each ’715 Accused Product also includes hardware and software constituting an auto focusing system.

55. The ’715 Accused Products make use of “a method of enhancing auto focus based on detection and tracking of a region of interest.” For example, the ’715 Accused Products detect and track a face or multiple faces and adjust the auto focus position accordingly.

56. The ’715 Accused Products “identify[] a first group of pixels that includes a region of interest within a digital image.” For example, the ’715 Accused Products involve a Camera application. When the Camera application is run and the camera is pointed at a human face, the ’715 Accused Product surrounds the face with a yellow circle.

57. On information and belief, the ’715 Accused Products “determin[e] a degree of focus of said first group of pixels.” For example, when the Camera application is run and the camera is pointed at a human face, the ’715 Accused Products make an adjustment to the lens position to focus on that face, indicating that they have determined its degree of focus.

58. On information and belief, the ’715 Accused Products “determin[e] an adjusted value of degree of focus for the first group of pixels.” For example, when the Camera

application is run and the camera is pointed at a human face, the '715 Accused Products make further adjustments to lens positions to focus on that face, indicating that they have determined its adjusted value of degree of focus.

59. On information and belief, the '715 Accused Products “track[] the region of interest within a stream of digital images.” For example, when the Camera application is run, as the face moves across the field of view of the camera, the yellow circle remains located on the face.

60. On information and belief, the '715 Accused Products “detect[] that the focus position of the region of interest has changed based on movement between the digital image and a subsequent image within the stream of digital images.” For example, when the Camera application on each Accused Product is run, as the face moves in the field of view of the camera, the '715 Accused Product adjusts focus to account for changes in the focus position associated with the face, indicating that it has detected changes in the focus position associated with the face.

61. On information and belief, the '715 Accused Products “automatically adjust[] focus position based upon the adjusted value of degree of focus and upon the detecting that the focus position of the region of interest has changed based on the movement.” For example, when the Camera application on each Accused Product is run, as the face moves in the field of view of the camera, the '715 Accused Product adjusts focus to account for changes in the focus position associated with the face.

62. Conventional autofocus technology did not focus based on the location of a region of interest in the frame and could not track a region of interest in a stream of images. As the specification of the '715 patent explains, conventional autofocus techniques were deficient

because they focused “arbitrarily on the center” of the image (which often would not be the area of interest), *see* ’715 patent at 24:18, 32:54-55, fig. 7a, or focused based on detecting the direction of the user’s eyes (which suffered from “saccade where the photographer moves his/her gaze quickly between a few points”), *id.* at 32:55-33:1; *see also id.* at 2:37-39. Or the user had to focus manually. *Id.* at 2:40-42. Photographers using conventional equipment to manually focus did not perform the specific steps claimed in the ’715 patent—for example, “identifying ... pixels,” tracking regions within digital image streams, “automatically” focusing, calculating “weighted average[s],” or assigning “estimated importance” or “detection assurance” values. The invention of the ’715 patent improved on computer and digital-processing technology by, among other things, tracking a face (or other region of interest) in real time in a preview stream of images. The claimed “track[ing]” does not include a photographer moving the camera to follow something of interest. This claimed “track[ing]” significantly increased autofocus accuracy and efficiency over conventional methods.

63. The dependent claims of the ’715 patent further improved over the conventional technology by, for example, providing for determining the “weighted average” of the regions of interest by assigning an “estimated importance” of the regions based on size, location or exposure or by assigning a “relative value of detection assurance” to each region. ’715 patent at 11:66-12:10. Those features, for example, mitigate the problem of false positive faces and increased accuracy without imposing additional heavy processing requirements. *Id.* at 11:57-12:13. The ’715 patent claims advance technology because they allow a camera to more accurately and efficiently autofocus on a moving object by using a particular mechanism to perform a series of specific steps for tracking the object and adjusting the focus based on factors such as the weighted average and the estimated importance of multiple regions.

64. In each claim, the claimed steps in combination are unconventional for the additional reasons that they describe a particular type of tracking-based autofocus involving determining a degree of focus, determining an adjusted value of degree of focus, detecting that a focus position has changed, and automatically adjusting focus position. Conventional “digital acquisition device[s] with an adjustable optical system having an auto focusing mechanism” could not track a face or other region of interest continuously as provided by the claim element related to “tracking the region of interest within a stream of images.” The claim elements providing “determining a degree of focus,” “determining an adjusted value of degree of focus,” “detecting that the focus position of the region of interest has changed” and “automatically adjusting focus position” require continuous information about the subject of the camera’s focus. The patent thus claims a combination that could not have been performed on any conventional system.

65. The ’715 patent claims priority to U.S. Patent App. No. 10/608,810. The U.S. Patent and Trademark Office examiner who reviewed that application explicitly noted finding that the patent’s claims are eligible under 35 U.S.C. § 101. U.S. Patent App. No. 10/608,810, Non-Final Rejection, 3 (Jan. 7, 2009), Notice of Allowability, 2 (April 29, 2009).

66. In each claim, the claimed steps in combination are unconventional, improve computer and digital processing technology, and solve problems in that field, producing better quality images.

67. By at least July 13, 2015, FotoNation provided Samsung a presentation entitled “face patents overview” that detailed some of the various technologies included in its patent portfolio, including an explicit identification of “Face Focus” as a technology that “15 Patents” in its portfolio addressed. On April 11, 2016, FotoNation also explicitly named the ’715 patent

to Samsung and provided a description of the general subject matter of the '715 patent and examples of relevant Samsung products or components that are believed to be using the '715 patent based on information FotoNation had obtained independently of Samsung. Thus, based on FotoNation's disclosure of the '715 patent to Samsung and the fact that discussions regarding the '715 patent occurred, Samsung has had knowledge of the '715 patent and that its activities infringe the '715 patent, should have known of these facts, and/or willfully blinded itself to these facts since at least July 13, 2015. Additionally, based on FotoNation's disclosures to Samsung and the fact that discussions regarding the '715 patent occurred, by at least July 13, 2015, Samsung has also known, should have known, and/or willfully blinded itself to the fact that its customers, distributors, importers, and other purchasers and users of the '715 Accused Products are infringing the '715 patent.

68. Samsung also actively, knowingly, and intentionally induces infringement of one or more claims of the '715 patent under 35 U.S.C. § 271(b) by actively encouraging others to use '715 Accused Products, or products containing infringing components in the '715 Accused Products, in this judicial district and elsewhere in the United States. Additionally, Samsung actively, knowingly, and intentionally induces infringement of one or more claims of the '715 patent under 35 U.S.C. § 271(b) by actively encouraging others, including but not limited to the purchasers or users of the '715 Accused Products, to use the face-tracking-based autofocus features of the '715 Accused Products in a way that directly infringes one or more claims of the '715 patent. For example, Samsung actively promotes the use of its face detection software and hardware and associated software and hardware for the infringing cell phones and tablets, and specifically promotes the use of infringing face-tracking-based autofocus features of the '715 Accused Products, in marketing materials, technical specifications, data sheets, web pages on its

website (e.g., www.samsung.com, specifically at www.samsung.com/global/galaxy/galaxy-s8/camera/ (last visited Sept. 26, 2017)), press releases (such as the press release available at news.samsung.com/global/in-depth-look-fast-fun-and-in-focus-the-galaxy-s8-camera (Mar. 30, 2017)), and user manuals, as well as at trade shows (e.g., CES and Mobile World Congress) and through its sales and distribution channels that encourage infringing uses, sales, offers for sale, and importation of the '715 Accused Products or products containing infringing components, and specifically encourages uses by others, including users or purchasers of the '715 Accused Products, in a way that directly infringes the '715 patent.

69. Samsung further actively, knowingly, and intentionally contributorily infringes one or more method claims of the '715 patent under 35 U.S.C. § 271(c) by knowingly making, selling, and/or offering to sell in the United States, and/or importing into the United States the '715 Accused Products that contain components that are especially made or especially adapted for practicing the method claims of the '715 patent and that are not a staple article or commodity of commerce suitable for substantial non-infringing use, in violation of 35 U.S.C. § 271(c). For example, the '715 Accused Products include face detection software and hardware and associated software and hardware that are especially adapted to practicing the method claims of the '715 patent that are not suitable for substantial non-infringing use. Others, including users or purchasers of the '715 Accused Products, use face-tracking-based autofocus features of the '715 Accused Products in a way that directly infringes the '715 patent.

70. Based solely on FotoNation's own information and independent investigation without reliance on any information provided by Samsung, Samsung has continued to use the '715 Accused Products in the United States and/or indirectly infringe the '715 patent in the United States despite its knowledge of the '715 patent, its infringement of that patent, and its

customers' infringement of that patent. Samsung's direct and indirect infringement has been and continues to be willful.

71. Plaintiff has suffered and continues to suffer damages as a result of Samsung's infringement of the '715 patent.

COUNT III
INFRINGEMENT OF THE '274 PATENT

72. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 54 as though fully set forth herein.

73. Samsung has infringed and continues to infringe one or more claims of the '274 patent, directly or indirectly, literally or under the doctrine of equivalents, by making, using, selling, and/or offering to sell in the United States and importing into the United States without authority at least the face detection software and hardware, beauty face software and hardware, and the associated software and hardware for the Galaxy S8, Galaxy S8+, Galaxy S7, Galaxy S7 Edge, Galaxy S6, Galaxy J3, Galaxy J3 Emerge, Galaxy Note 8, Galaxy Tab S2, Galaxy Tab S3, Galaxy Tab A, Galaxy Tab A With S Pen, Galaxy Tab E, Galaxy View, Galaxy Tab E Lite, Samsung Kids Powered by Galaxy Tab E Lite, Galaxy S6 Edge, Galaxy S6 Active, Galaxy Note 5, Galaxy S7 Active, Galaxy J7, Galaxy Tab E Nook, and cell phone and tablet products with similar relevant functionality (collectively, "'274 Accused Products").

74. For example, Samsung has directly infringed and continues to directly infringe claim 5 of the '274 patent and other claims that depend from claim 5, literally or under the doctrine of equivalents, by using in the United States without authority at least the '274 Accused Products.

75. The '274 Accused Products each comprise "an apparatus including a processor configured for image processing" techniques and "process[] a digital image using face detection

in said image to achieve a desired image processing parameter.” For example, each Galaxy S8 contains a processor that is configured for image processing as described below.

76. The ’274 Accused Products “automatically identify[] a group of pixels that correspond to an image of a face within the digital image.” For example, the ’274 Accused Products contain a Camera application. When the Camera application is run and the camera on the ’274 Accused Product is pointed at a human face, the ’274 Accused Product surrounds the face with a yellow circle.

77. The ’274 Accused Products perform “generating in-camera, capturing or otherwise obtaining in-camera a collection of low resolution images including said face.” For example, when the Camera application on each ’274 Accused Product is run, the image sensor captures images, and those images are displayed on the device’s screen using a lower resolution than that of the final captured image.

78. On information and belief, the ’274 Accused Products “track[] said face within said collection of low resolution images.” For example, when the Camera application on each ’274 Accused Product is run, as the face moves across the field of view of the camera, the yellow circle remains located on the face.

79. On information and belief, the ’274 Accused Products “determin[e] default values of one or more parameters of at least some portion of said digital image.” For example, photo editing options in the ’274 Accused Products such as Bright Face, Soften Face, and Spotlight each contain sliders, which begin at an initial position and can be dragged to increase an image processing effect.

80. On information and belief, the ’274 Accused Products “adjust[] values of the one or more parameters within the digitally-detected image based upon an analysis of said digital

image including said image of said face and said default values.” For instance, photo editing options such as Bright Face, Soften Face, and Spotlight in the ’274 Accused Products each contain sliders whose value can be adjusted upward from zero. These photo editing options are only available when a face has been detected in the image.

81. On information and belief, the ’274 Accused Products “automatically provid[e] a fill flash to digitally add exposure to brighten the group of pixels that correspond to said image of said face while not digitally adding exposure to nor otherwise brightening one or more other pixels within the digital image.” For instance, when the value of the Bright Face, Soften Face, or Spotlight sliders are increased in the ’274 Accused Products, the image is correspondingly adjusted to brighten, soften, or add a spotlight effect to the user’s face. When this adjustment is performed, the effect is concentrated in the face region of the image.

82. Conventional methods and systems for digital image processing did not use detection and knowledge of faces in images to create and/or use tools for the enhancement or correction of the images. *See* ’274 patent at 1:64-67. The claimed invention improved on computer and digital-processing technology by, among other things, detecting a face, tracking the face, and automatically providing a fill flash to digitally add exposure to brighten the face while not digitally adding exposure to nor otherwise brightening one or more other pixels within the digital image. The methods and the systems taught by the ’274 patent are advantageous over the prior art of an analog fill-flash using a camera’s actual flash bulb, because post-capture digital fill flash provides the additional advantage of being adjustable based on, for example, luminance maps or histograms of other image parameters. The claimed “tracking” does not include a photographer moving the camera to follow something of interest. The claimed tracking significantly increased autofocus accuracy and efficiency over conventional methods.

83. The dependent claims further improved over the conventional technology by, for example, receiving and executing a manual command to remove a false indication of another face within the image, thus improving the system's accuracy.

84. In each claim, the claimed steps in combination are unconventional, improve computer and digital processing technology, solve problems in that field, and provide more efficient and better image-enhancement.

85. By at least July 13, 2015, FotoNation provided Samsung a presentation entitled "face patents overview" that detailed some of the various technologies included in its patent portfolio, including an explicit identification of "Fill Flash" as a technology that "4" patents in its portfolio addressed. On April 11, 2016, FotoNation also explicitly named the '274 patent to Samsung and provided a description of the general subject matter of the '274 patent and examples of relevant Samsung products or components that are believed to be using the '274 patent based on information FotoNation had obtained independently of Samsung. Thus, based on FotoNation's disclosure of the '274 patent to Samsung and the fact that discussions regarding the '274 patent occurred, Samsung has had knowledge of the '274 patent and that its activities infringe the '274 patent, should have known of these facts, and/or willfully blinded itself to these facts since at least July 13, 2015. Additionally, based on FotoNation's disclosures to Samsung and the fact that discussions regarding the '274 patent occurred, by at least July 13, 2015, Samsung has also known, should have known, and/or willfully blinded itself to the fact that its customers, distributors, importers, and other purchasers and users of the '274 Accused Products are infringing the '274 patent.

86. Samsung also actively, knowingly, and intentionally induces infringement of one or more claims of the '274 patent under 35 U.S.C. § 271(b) by actively encouraging others to use

'274 Accused Products, or products containing infringing components in the '274 Accused Products, in this judicial district and elsewhere in the United States. Additionally, Samsung actively, knowingly, and intentionally induces infringement of one or more claims of the '274 patent under 35 U.S.C. § 271(b) by actively encouraging others, including but not limited to the purchasers or users of the '274 Accused Products, to use the face-tracking-based beauty face features of the '274 Accused Products in a way that directly infringes one or more claims of the '274 patent. For example, Samsung actively promotes the use of its infringing face detection software and hardware, beauty face software and hardware, and the associated software and hardware for the cell phones and tablets, and specifically promotes the use of infringing face-tracking-based beauty face features of the '274 Accused Products, in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.samsung.com, specifically at www.samsung.com/global/galaxy/galaxy-s8/camera/ (last visited Sept. 26, 2017); <http://www.samsung.com/global/galaxy/galaxy-s7/camera/> (last visited Sept. 26, 2017)), press releases, and user manuals (e.g., Advance on Samsung Galaxy S6 / S6 edge 4G+; Samsung Galaxy S6 User Manual), as well as at trade shows (e.g., CES and Mobile World Congress) and through its sales and distribution channels that encourage infringing uses, sales, offers for sale, and importation of the '274 Accused Products or products containing infringing components, and specifically encourages uses by others, including users or purchasers of the '274 Accused Products, in a way that directly infringes the '274 patent.

87. Samsung further actively, knowingly, and intentionally contributorily infringes one or more method claims of the '274 patent under 35 U.S.C. § 271(c) by knowingly making, selling, and/or offering to sell in the United States, and/or importing into the United States the '274 Accused Products that contain components that are especially made or especially adapted

for practicing the method claims of the '274 patent and that are not a staple article or commodity of commerce suitable for substantial non-infringing use, in violation of 35 U.S.C. § 271(c). For example, the '274 Accused Products include face detection software and hardware, beauty face software and hardware, and the associated software and hardware components that are especially adapted to practicing the method claims of the '274 patent that are not suitable for substantial non-infringing use. Others, including users or purchasers of the '274 Accused Products, use face-tracking-based beauty face features of the '274 Accused Products in a way that directly infringes the '274 patent.

88. Based solely on FotoNation's own information and independent investigation without reliance on any information provided by Samsung, Samsung has continued to use the '274 Accused Products in the United States and/or indirectly infringe the '274 patent despite its knowledge of the '274 patent, its infringement of that patent, and its customers' infringement of that patent. Samsung's direct and indirect infringement has been and continues to be willful.

89. Plaintiff has suffered and continues to suffer damages as a result of Samsung's infringement of the '274 patent.

COUNT IV
INFRINGEMENT OF THE '829 PATENT

90. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 69 as though fully set forth herein.

91. Samsung has infringed and continues to infringe one or more claims of the '829 patent, directly or indirectly, literally or under the doctrine of equivalents, by making, using, selling, and/or offering to sell in the United States, and/or importing into the United States without authority at least the camera module hardware and associated software for zoom and/or autofocus for the Samsung Galaxy S6, Samsung Galaxy S6 edge, Samsung Galaxy S7, Samsung

Galaxy S7 edge, Samsung Galaxy S8, Samsung Galaxy S8+, Samsung Galaxy Note8, Samsung Galaxy Note5, Samsung Galaxy J3, Samsung Galaxy J3 Emerge, Samsung Galaxy Tab S2 8”, Samsung Galaxy Tab S3, Samsung Galaxy TabPro S, Samsung Galaxy Tab A 10”, Samsung Galaxy Tab S2 9.7”, Samsung Galaxy Tab E 8”, Samsung Galaxy Tab A 7”, Samsung Tab A 8”, and Samsung Galaxy Tab E 9.6” and other products with similar relevant functionality, such as other devices containing a camera module with a semiconductor Voice Coil Motor (“VCM”) driver chip or chips substantially similar to a semiconductor VCM driver chip (collectively, “’829 Accused Products”).

92. For example, Samsung has directly infringed and continues to directly infringe claim 7 of the ’829 patent, literally or under the doctrine of equivalents, by using in the United States without authority the ’829 Accused Products.

93. The ’829 Accused Products include a rear-facing miniature camera module that includes an auto-focus feature that allows a lens unit to move up and down over the fixed image sensor to implement at least one of zoom and autofocus.

94. The ’829 Accused Products “receiv[e] information indicative of a target position of a portion of a stage system included in a miniature camera, the target position being different than a current position of the portion of the stage system and included in a range extending from a minimum position to a maximum position, and wherein the stage system has at least one mechanical resonance frequency.” For example, the rear-facing camera module of the ’829 Accused Products is a miniature camera. The rear-facing camera module contains an Autofocus VCM driver chip (“VCM driver”) and a lens positioning module that contains a moveable positioner that supports a lens. The VCM driver receives information indicative of a target position for the moveable positioner supporting the lens that is different than the positioner’s

current position, wherein the target position is within the range of the positioner's maximum and minimum positions above a fixed image sensor. The positioner supporting the lens has at least one mechanical resonance frequency.

95. The '829 Accused Products "generat[e] a waveform configured to move the portion to the target position, the waveform not including the at least one mechanical resonance frequency." For example, the rear-facing camera module of the '829 Accused Products contains a VCM driver that is used to control the positioning of the moveable positioner carrying the lens. The VCM driver can move the positioner in a range of positions from a minimum position to a maximum position. The VCM driver moves the positioner supporting the lens by sending a driving current waveform to a conducting coil in the camera module. When the VCM driver supplies the coil with the driving current waveform, it creates a magnetic field. This magnetic field interacts with the magnet on the moveable positioner causing the positioner supporting the lens to move from a first position to a target position over the image sensor. On information and belief, the driving current waveform outputted from the VCM driver does not include at least one mechanical resonance frequency of the moveable positioner supporting the lens.

96. The '829 Accused Products receive said "information indicative of the target position [that] is indicative of a desired zoom or focus of the miniature camera." For example, the rear-facing camera module of the '829 Accused Products is a miniature camera. The rear-facing camera module includes a VCM driver that outputs a driving current waveform to the current-carrying coil. The magnetic field created by the current-carrying coil interacts with the magnet on the moveable positioner supporting the lens thereby causing the positioner to move the lens relative to the fixed image sensor to implement at least one of zoom and autofocus of the miniature camera.

97. On information and belief, the '829 Accused Products further “generat[e] the waveform using a low pass filter.” The VCM driver employs a low pass filter to filter the driving current waveform such that the energy of the driving current waveform at one or more resonant frequencies of the moveable positioner supporting the lens is substantially zero.

98. Conventional stage systems for miniature or micro-electromechanical cameras could not move a portion of the stage system, such as the lens assembly, rapidly and accurately to a desired position without the portion of the stage system experiencing an undesirable level of ringing or oscillation upon reaching the target position. The invention of the '829 improved the actuation technology related to stage systems for miniature and micro-electromechanical cameras by, among other things, providing a method, as well as a device and system to perform such method, for generating an actuation waveform that causes a portion of the stage system, such as the lens assembly, to move to a target position quickly and accurately with substantially no ringing or oscillation, and thereby allowing for quicker and more accurate focus.

99. The dependent claims of the '829 patent further improved over the conventional technology by, for example, providing methods, as well as a device and system to perform such methods, for shaping and filtering the actuation waveform to ensure the portion of the stage system, such as the lens assembly, would move to the target position with substantially no ringing or oscillation, and thereby increasing the accuracy of the camera's zoom and/or focus without imposing additional heavy processing requirements.

100. In each claim, the claimed steps or elements in combination are unconventional for the additional reasons that they describe a particular type of actuation method or device for a stage system in a miniature or micro-electromechanical camera, as well as a device and system to perform such method, whereby information of a target position for a portion of the stage system

that is different than the current position is received, an actuation waveform is generated that moves the portion of the stage system to the target position with substantially no ringing or oscillation, and whereby the target position is indicative of a desired zoom or focus of the miniature camera. In each claim, the claimed steps or elements in combination are unconventional, improve computer and digital processing technology, and solve problems in that field, producing better quality images.

101. On September 12, 2013, DigitalOptics provided SEC's subsidiary, Samsung Electro-Mechanics ("SEMC"), with an overview of DigitalOptics's camera patent portfolio that explicitly named the '829 patent to Samsung. On information and belief SEMC is the Samsung subsidiary involved in the selection and design of the camera modules of the '829 Accused Products. On April 11, 2016, FotoNation explicitly named the '829 patent to Samsung and provided a description of the general subject matter of the '829 patent and examples of relevant Samsung products or components that are believed to be using the '829 patent based on information FotoNation had obtained independently of Samsung. By at least May 2, 2016, FotoNation also provided Samsung a presentation entitled "Claim Chart U.S. Patent 7,697,829" that detailed the technologies claimed in the '829 patent and had identified at least some of Samsung's products, such as Samsung Galaxy S6 & S6 Edge, and activities that infringed the '829 patent based on information FotoNation had obtained independently of Samsung. Thus, based on FotoNation's disclosure of the '829 patent to Samsung and the fact that discussions regarding the '829 patent occurred, Samsung has had knowledge of the '829 patent and that its activities infringe the '829 patent, should have known of these facts, and/or willfully blinded itself to these facts since at least September 12, 2013. Additionally, based on FotoNation's disclosures to Samsung and the fact that discussions regarding the '829 patent occurred, by at

least September 12, 2013, Samsung has also known, should have known, and/or willfully blinded itself to the fact that its customers, distributors, importers, and other purchasers of the '829 Accused Products are infringing the '829 patent.

102. Based solely on FotoNation's own information and independent investigation without reliance on any information provided by Samsung, Samsung has continued to make, use, offer for sale, and/or sell the '829 Accused Products in the United States and/or import the '829 Accused Products into the United States despite its knowledge of the '829 patent and its infringement of that patent. Samsung's infringement has been and continues to be willful.

103. Samsung also actively, knowingly, and intentionally induces infringement of one or more claims of the '829 patent under 35 U.S.C. § 271(b) by actively encouraging others to make, use, offer to sell, sell, and/or import '829 Accused Products or products containing infringing components in the '829 Accused Products, in this judicial district and elsewhere in the United States. Additionally, Samsung actively, knowingly, and intentionally induces infringement of one or more claims of the '829 patent under 35 U.S.C. § 271(b) by actively encouraging others, including but not limited to the purchasers or users of the '829 Accused Products, to use the zoom and/or autofocus features of the '829 Accused Products in a way that directly infringes one or more claims of the '829 patent. For example, Samsung actively promotes the sale, use, and importation of its infringing camera module hardware and associated software for zoom and/or autofocus in the infringing cell phones, such as but not limited to the Galaxy S6 and S6 Edge, and specifically promotes the zoom and/or autofocus features of the '829 Accused Products by promoting and/or encouraging users and purchasers to use the "Autofocus" feature of the '829 Accused Products, in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.samsung.com, specifically at

<http://www.samsung.com/global/galaxy/what-is/auto-focus/> (last visited Sept. 26, 2017)), press releases, and user manuals (e.g., Samsung Galaxy S6 User Manual), as well as at trade shows (e.g., CES and Mobile World Congress) and through its sales and distribution channels that encourage infringing sales, offers to sell, and importations of the '829 Accused Products or products containing infringing autofocus camera modules with VCM chip drivers, and specifically encourages uses of the zoom and/or autofocus features, such as the "Autofocus" feature, of the '829 Accused Products by others, including users or purchasers of the '829 Accused Products, in a way that directly infringes the '829 patent.

104. Samsung further actively, knowingly, and intentionally contributorily infringes one or more method claims of the '829 patent under 35 U.S.C. § 271(c) by knowingly making, selling, and/or offering to sell in the United States, and/or importing into the United States the '829 Accused Products that contain components that are especially made or especially adapted for practicing the method claims of the '829 patent and that are not a staple article or commodity of commerce suitable for substantial non-infringing use, in violation of 35 U.S.C. § 271(c). For example, the '829 Accused Products include camera module hardware and associated software for zoom and/or autofocus that are especially adapted to practicing the method claims of the '829 patent that are not suitable for substantial non-infringing use. Others, including users or purchasers of the '829 Accused Products, use the zoom and/or autofocus features of the '829 Accused Products in a way that directly infringes the '829 patent.

105. Plaintiff has suffered and continues to suffer damages as a result of Samsung's infringement of the '829 patent.

COUNT V
INFRINGEMENT OF THE '016 PATENT

106. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 82 as though fully set forth herein.

107. Samsung has infringed and continues to infringe one or more claims of the '016 patent, directly or indirectly, literally or under the doctrine of equivalents, by making, using, selling, and/or offering to sell in the United States and importing into the United States without authority at least the face detection software and hardware and associated software and hardware for the Samsung Galaxy Note 8, Samsung Galaxy Note 5, Samsung Galaxy S8+, Samsung Galaxy S8, Samsung Galaxy S7, Samsung Galaxy S7 Edge, Samsung Galaxy S7 Active, Samsung Galaxy S6, Samsung Galaxy S6 Edge, Samsung Galaxy S6 Active, Samsung Galaxy J3 Emerge, Samsung Galaxy J3, Samsung Galaxy J7, Samsung Galaxy Tab A With Pen, Samsung Galaxy Tab A, Samsung Galaxy Tab Pro S, Samsung Galaxy Tab S3, Samsung Galaxy Tab S2, Samsung Galaxy Tab E, Samsung Galaxy Tab E Nook, Samsung Galaxy Tab E Lite, Samsung Kids – Powered by Galaxy Tab E Lite, and the Samsung Galaxy View, and cell phones and tablet products with similar relevant functionality (collectively, “'016 Accused Products”).

108. For example, Samsung has directly infringed and continues to directly infringe claim 1 of the '016 patent and other claims that depend from claim 1, literally or under the doctrine of equivalents, by using in the United States without authority at least the '016 Accused Products.

109. As described below, the '016 Accused Products perform a “method of processing a digital image using face detection within said image to achieve one or more desired image processing parameters.” The '016 Accused Products each perform a method “using a portable

microprocessor-based image acquisition device.” For example, each Galaxy S8 contains a processor that is programmed as described below.

110. The ’016 Accused Products “acquir[e] a temporally-sequential collection of two or more images of substantially a same scene.” For example, when the Camera application is run in connection with each ’016 Accused Product, the image sensor captures a sequence of preview images, and those images are displayed on the device’s screen.

111. The ’016 Accused Products “identify[] and track[] at least one group of pixels that corresponds to an image of a same face region across said collection of images.” For example, when the Camera application is run in connection with the ’016 Accused Products and the camera is pointed at a human face, the ’016 Accused Product surrounds the face with a yellow circle, which remains located on the face as the face moves across the camera’s field of view.

112. On information and belief, the ’016 Accused Products “determin[e] default values of one or more parameters of at least some common portion of said images.” For example, the ’016 Accused Products determine white-balance and exposure adjustment values to be applied digitally based on an analysis of the preview images.

113. On information and belief, the ’016 Accused Products “modify[] values of the one or more parameters within a main acquired image based upon an analysis of said face region and the default parameter values determined based on the collection of images.” For example, the ’016 Accused Products digitally modify the white-balance and exposure values based on an analysis of the face region and the default white-balance and exposure adjustment values determined from the collection of images.

114. On information and belief, the ’016 Accused Products “render[], transmit[], transfer[], stor[e], upload[], cach[e], or display[] said modified image or a further processed

version, or combinations thereof.” For instance, the ’016 Accused products render and display the image with the white-balance and exposure adjustments on the device’s screen once the image is captured and processed.

115. Conventional image-adjustment technology modified parameters of an acquired image without regard for the location of faces in the image and without the ability to track faces in a preview stream of images. The invention of the ’016 patent improved on computer and digital-processing technology by, among other things, “identifying and tracking” a face in real time in a preview stream of images and using the location of that face to modify parameters of an acquired image—enhancing efficiency and real-time operation. *See, e.g.*, ’016 patent at 8:46-56. The claims of the ’016 patent thus provide a specific means to achieve their technical goal. For example, claim 1 recites “using a portable microprocessor-based image acquisition device” to acquire “two or more images of substantially a same scene,” “track[] at least one group of pixels that corresponds to an image of a same face region across said collection of images,” “determin[e] default values,” and modify the parameters of an acquired image according to a particular analysis of the “face region and the default parameter values.” The claimed “track[ing]” does not include a photographer moving the camera to follow something of interest and significantly increased accuracy and efficiency over conventional methods.

116. A dependent claim of the ’016 patent further improves the technology by providing for adjusting a parameter in a recently acquired image based on determinations performed on images acquired earlier in the stream, thus improving the system’s speed and responsiveness. Other dependent claims require details that improve the functioning of the image-adjustment technology, including specific requirements for relative image resolutions and a same face region across images.

117. In each claim, the claimed steps in combination are unconventional for the additional reasons that they provide more accurate and efficient image-enhancement by tracking faces and thus represent a technological solution that improves digital camera functionality. Conventional “portable microprocessor-based image acquisition device[s]” could not track a face continuously as provided by the claim element related to “identifying and tracking at least one group of pixels that corresponds to an image of a same face region across said collection of images.” The claimed “modifying values of the one or more parameters” may be based on continuous information obtained about a face. The claimed invention therefore provides the capability to use continuous information not available in conventional devices to modify parameters—a technological improvement that renders the claimed invention further unconventional. Dependent claim 6, for example, states such a technological improvement explicitly: providing for a modification of one or more parameters “within a most recently acquired image of the collection based upon an analysis of said face region and the default parameter values of one or more preceding images of the collection.”

118. The U.S. Patent and Trademark Office examiner who reviewed the application that led to the '016 patent explicitly made the finding that the patent's claims are eligible under 35 U.S.C. § 101. U.S. Patent App. No. 10/608,810, Non-Final Rejection, 3 (Jan. 7, 2009), Notice of Allowability, 2 (April 29, 2009).

119. In each claim, the claimed steps in combination are unconventional, improve computer and digital processing technology, and solve problems in that field, producing better quality images.

120. By at least July 13, 2015, FotoNation provided Samsung a presentation entitled “face patents overview” that detailed some of the various technologies included in its patent

portfolio, including an explicit identification of “Modify Main Image” as a technology that “17 patents” in its portfolio addressed. On April 11, 2016, FotoNation also explicitly named the ’016 patent to Samsung and provided a description of the general subject matter of the ’016 patent and examples of relevant Samsung products or components that are believed to be using the ’016 patent based on information FotoNation had obtained independently of Samsung. Thus, based on FotoNation’s disclosure of the ’016 patent to Samsung and the fact that discussions regarding the ’016 patent occurred, Samsung has had knowledge of the ’016 patent and that its activities infringe the ’016 patent, should have known of these facts, and/or willfully blinded itself to these facts since at least July 13, 2015. Additionally, based on FotoNation’s disclosures to Samsung and the fact that discussions regarding the ’016 patent occurred, by at least July 13, 2015, Samsung has also known, should have known, and/or willfully blinded itself to the fact that its customers, distributors, importers, and other purchasers and users of the ’016 Accused Products are infringing the ’016 patent.

121. Samsung also actively, knowingly, and intentionally induces infringement of one or more claims of the ’016 patent under 35 U.S.C. § 271(b) by actively encouraging others to use ’016 Accused Products, or products containing infringing components in the ’016 Accused Products, in this judicial district and elsewhere in the United States. Additionally, Samsung actively, knowingly, and intentionally induces infringement of one or more claims of the ’016 patent under 35 U.S.C. § 271(b) by actively encouraging others, including but not limited to the purchasers or users of the ’016 Accused Products, to use the face-tracking-based image enhancement features of the ’016 Accused Products in a way that directly infringes one or more claims of the ’016 patent. For example, Samsung actively promotes the use of its face detection software and hardware and associated software and hardware for cell phones and tablets, and

specifically promotes the use of infringing face-tracking-based image enhancement features of the '016 Accused Products, in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.samsung.com, specifically at www.samsung.com/global/galaxy/galaxy-s8/camera/ (last visited Sept. 26, 2017)), press releases, and user manuals, as well as at trade shows (e.g., CES and Mobile World Congress) and through its sales and distribution channels that encourage infringing uses, sales, offers for sale, and importation of the '016 Accused Products or products containing infringing components, and specifically encourages uses by others, including users or purchasers of the '016 Accused Products, in a way that directly infringes the '016 patent.

122. Samsung further actively, knowingly, and intentionally contributorily infringes one or more method claims of the '016 patent under 35 U.S.C. § 271(c) by knowingly making, selling, and/or offering to sell in the United States, and/or importing into the United States the '016 Accused Products that contain components that are especially made or especially adapted for practicing the method claims of the '016 patent and that are not a staple article or commodity of commerce suitable for substantial non-infringing use, in violation of 35 U.S.C. § 271(c). For example, the '016 Accused Products include face detection software and hardware and associated software and hardware that are especially adapted to practicing the method claims of the '016 patent that are not suitable for substantial non-infringing use. Others, including users or purchasers of the '016 Accused Products, use face-tracking-based image enhancement features of the '016 Accused Products in a way that directly infringes the '016 patent.

123. Based solely on FotoNation's own information and independent investigation without reliance on any information provided by Samsung, Samsung has continued to use the '016 Accused Products in the United States and/or indirectly infringe the '016 patent despite its

knowledge of the '016 patent, its infringement of that patent, and its customers' infringement of that patent. Samsung's direct and indirect infringement has been and continues to be willful.

124. Plaintiff has suffered and continues to suffer damages as a result of Samsung's infringement of the '016 patent.

COUNT VI
INFRINGEMENT OF THE '218 PATENT

125. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 96 as though fully set forth herein.

126. Samsung has infringed and continues to infringe one or more claims of the '218 patent, directly or indirectly, literally or under the doctrine of equivalents, by making, using, selling, and/or offering to sell in the United States and importing into the United States without authority at least the face detection software and hardware and associated software and hardware for the Samsung Galaxy Note 8, Samsung Galaxy Note 5, Samsung Galaxy S8+, Samsung Galaxy S8, Samsung Galaxy S7, Samsung Galaxy S7 Edge, Samsung Galaxy S7 Active, Samsung Galaxy S6, Samsung Galaxy S6 Edge, Samsung Galaxy S6 Active, Samsung Galaxy J3 Emerge, Samsung Galaxy J3, Samsung Galaxy J7, Samsung Galaxy Tab A With Pen, Samsung Galaxy Tab A, Samsung Galaxy Tab Pro S, Samsung Galaxy Tab S3, Samsung Galaxy Tab S2, Samsung Galaxy Tab E, Samsung Galaxy Tab E Nook, Samsung Galaxy Tab E Lite, Samsung Kids – Powered by Galaxy Tab E Lite, and the Samsung Galaxy View, and cell phones and tablet products with similar relevant functionality (collectively, "'218 Accused Products").

127. For example, Samsung has directly infringed and continues to directly infringe claim 26 of the '218 patent and other claims that depend from claim 26, literally or under the doctrine of equivalents, by using in the United States without authority at least the '218 Accused Products.

128. The '218 Accused Products each perform a method “using a digital image acquisition device.” For example, each Galaxy S8 contains a processor that is programmed as described below.

129. The '218 Accused Products receive “a reference image stream.” For example, when the Camera application is run in connection with each '218 Accused Product, the image sensor captures a stream of preview images, and those preview images are displayed on the device's screen. As explained in more detail below, the '218 Accused Products “detect[] faces in [this] reference image stream.”

130. The '218 Accused Products “receiv[e] a first acquired image from said reference image stream including one or more face regions.” For example, when the Camera application is run in connection with the '218 Accused Products and the camera is pointed at a human face, the '218 Accused Products receive an image with a region including a face.

131. On information and belief, the '218 Accused Products “sub-sampl[e] said first acquired image at a specified resolution one or more times to provide one or more sub-sampled images.” For example, the '218 Accused Products subsample this first image of the preview stream to a lower-resolution image to be used for face-detection.

132. On information and belief, the '218 Accused Products “identify[] one or more regions of said first acquired image including said one or more face regions within said one or more subsampled images of said first acquired image with probabilities each above a predetermined threshold” and “determin[e] a respective size and location of each identified face region within said first acquired image” For example, the '218 Accused Products place a yellow circle over one or more regions of an image in the preview stream when those regions contain a face.

133. On information and belief, the '218 Accused Products "receiv[e] a second acquired image from said reference image stream, and sub-sampl[e] and apply[] face detection to one or more regions of said subsequent acquired image calculated as probably including one or more face regions corresponding to said one or more face regions identified in said first acquired image." For example, when the Camera application is run in connection with the '218 Accused Products and the camera is pointed at a human face, the preview screen displays a series of subsequent images in which the yellow circle surrounding the face remains located on the face as the face moves across the camera's field of view.

134. On information and belief, the '218 Accused Products "acquir[e] a full resolution main image and apply[] image processing based on said face detection applied to said first and second images of said reference image stream." For example, when the user presses a shutter button, the '218 Accused Products acquire a main image at the camera's full resolution and detect faces and digitally adjust at least the image's white balance and exposure based in part on the location and/or size of the faces identified in the preview image stream.

135. The '218 Accused Products "display[], stor[e], or transmit[] the processed version of said main image, or combinations thereof." For example, after adjusting at least the acquired full-resolution image's white balance and exposure, the '218 Accused Products display this image on the screen or store it on memory onboard the Samsung phone on which the '218 Accused Product is located.

136. The invention of the '218 patent improved on conventional computer and digital-processing technology through several technological advances allowing face-tracking and image-adjustment to be performed more efficiently and effectively in a resource-constrained environment. In each claim, the claimed steps in combination further provide an unconventional

method for tracking a face in specific resource-efficient ways that represent a technological advance.

137. Conventional image-processing technology was incapable of tracking faces and processing an image accordingly. Even if prior art disclosing tracking were considered conventional, prior-art tracking methods were too processor-intensive to be performed by the camera itself—resulting in a process that was either too slow or of unacceptably low quality to be useful in practical application to a resource-constrained environment such as a portable camera or mobile phone. *See, e.g.*, '218 patent at 3:5-16 (distinguishing a prior art algorithm and reference). A photographer using a conventional camera to manually adjust parameters could not have performed the claimed processes, which require making decisions based on “image streams,” tracking faces by determining the “size” and “location” of a face based on a discrete series of “preview images,” predicting future size and location based on such “preview images,” or continuously adjusting parameters in real time.

138. The patent solves those problems and others, improving computer and digital-processing technology by allowing those processes to be performed more efficiently and effectively in a resource-constrained environment in real time. *See, e.g., id.* at 2:8-9 (“invention provides improved real-time face tracking in a digital image acquisition device”). It does so by requiring specific technological improvements. The claims provide, for example, determining relative movement between images, predicting the size and location of a face, applying concentrated face detection, tracking faces of different sizes, merging sets of candidate face regions, subsampling, and using probability thresholds. Predicting the size and location of a face and determining relative movement between images can allow for efficiency gains by simplifying the computations necessary to locate a face. Subsampling may decrease the amount

of data required to represent a given area in an image, thus generally decreasing processing requirements. Using probability thresholds, tracking faces of different sizes, merging sets of candidate face regions, or applying concentrated face detection, for example, creates additional processing efficiencies by allowing accurate face detection with more flexibility in the selection of face-detection windows. In each claim, the claimed steps in combination are unconventional for the additional reasons that they provide a method for tracking a face in specific, resource-efficient ways that represent a technological advance.

139. U.S. Patent App. No. 12/479,593 is a continuation in part of the application that led to the '218 patent. The U.S. Patent and Trademark Office examiner who reviewed U.S. Patent App. No. 12/479,593 explicitly considered all claims allowable under 35 U.S.C. § 101—rejecting some claims under § 101 and then ultimately allowing all claims after modifications to the rejected claims. U.S. Patent App. No. 12/479,593, Non-Final Rejection, 1-6 (June 3, 2010), Notice of Allowability, 1-3 (Jan. 3, 2011).

140. In each claim, the claimed steps in combination are unconventional, improve computer and digital processing technology, and solve problems in that field, producing better quality images.

141. By at least July 13, 2015, FotoNation provided Samsung a presentation entitled “face patents overview” that detailed some of the various technologies included in its patent portfolio, including an explicit identification of “Modify Main Image” as a technology that “17 patents” in its portfolio addressed. Samsung additionally has notice of the '218 patent and the '218 Accused Products' infringement as of the date of service of this Complaint. Thus, based on FotoNation's disclosure of the '218 patent to Samsung and the fact that discussions regarding the '218 patent occurred, Samsung has had knowledge of the '218 patent and that its activities

infringe the '218 patent, should have known of these facts, and/or willfully blinded itself to these facts since at least July 13, 2015. Additionally, based on FotoNation's disclosures to Samsung and the fact that discussions regarding the '218 patent occurred, by at least July 13, 2015, Samsung has also known, should have known, and/or willfully blinded itself to the fact that its customers, distributors, importers, and other purchasers and users of the '218 Accused Products are infringing the '218 patent.

142. Samsung also actively, knowingly, and intentionally induces infringement of one or more claims of the '218 patent under 35 U.S.C. § 271(b) by actively encouraging others to use '218 Accused Products, or products containing infringing components in the '218 Accused Products, in this judicial district and elsewhere in the United States. Additionally, Samsung actively, knowingly, and intentionally induces infringement of one or more claims of the '218 patent under 35 U.S.C. § 271(b) by actively encouraging others, including but not limited to the purchasers or users of the '218 Accused Products, to use the face-tracking-based image enhancement features of the '218 Accused Products in a way that directly infringes one or more claims of the '218 patent. For example, Samsung actively promotes the use of its infringing face detection software and hardware and associated software and hardware, and specifically promotes the use of infringing face-tracking-based image enhancement features of the '218 Accused Products, in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.samsung.com, specifically at www.samsung.com/global/galaxy/galaxy-s8/camera/ (last visited Sept. 26, 2017)), press releases, and user manuals, as well as at trade shows (e.g., CES and Mobile World Congress), and through its sales and distribution channels that encourage infringing uses, sales, offers for sale, and importation of the '218 Accused Products or products containing infringing components, and specifically encourages uses by

others, including users or purchasers of the '218 Accused Products, in a way that directly infringes the '218 patent.

143. Samsung further actively, knowingly, and intentionally contributorily infringes one or more method claims of the '218 patent under 35 U.S.C. § 271(c) by knowingly making, selling, and/or offering to sell in the United States, and/or importing into the United States the '218 Accused Products that contain components that are especially made or especially adapted for practicing the method claims of the '218 patent and that are not a staple article or commodity of commerce suitable for substantial non-infringing use, in violation of 35 U.S.C. § 271(c). For example, the '218 Accused Products include face detection software and hardware and associated software and hardware that are especially adapted to practicing the method claims of the '218 patent that are not suitable for substantial non-infringing use. Others, including users or purchasers of the '218 Accused Products, use face-tracking-based image enhancement features of the '218 Accused Products in a way that directly infringes the '218 patent.

144. Based solely on FotoNation's own information and independent investigation without reliance on any information provided by Samsung, Samsung has continued to use the '218 Accused Products in the United States and/or indirectly infringe the '218 patent despite its knowledge of the '218 patent, its infringement of that patent, and its customers' infringement of that patent. Samsung's direct and indirect infringement has been and continues to be willful.

145. Plaintiff has suffered and continues to suffer damages as a result of Samsung's infringement of the '218 patent.

COUNT VII
INFRINGEMENT OF THE '897 PATENT

146. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 112 as though fully set forth herein.

147. Samsung has infringed and continues to infringe one or more claims of the '897 patent, directly or indirectly, literally or under the doctrine of equivalents, by making, using, selling, and/or offering to sell in the United States and importing into the United States without authority at least the face detection software and hardware and associated software and hardware for the Samsung Galaxy Note 8, Samsung Galaxy Note 5, Samsung Galaxy S8+, Samsung Galaxy S8, Samsung Galaxy S7, Samsung Galaxy S7 Edge, Samsung Galaxy S7 Active, Samsung Galaxy S6, Samsung Galaxy S6 Edge, Samsung Galaxy S6 Active, Samsung Galaxy J3 Emerge, Samsung Galaxy J3, Samsung Galaxy J7, Samsung Galaxy Tab A With Pen, Samsung Galaxy Tab A, Samsung Galaxy Tab Pro S, Samsung Galaxy Tab S3, Samsung Galaxy Tab S2, Samsung Galaxy Tab E, Samsung Galaxy Tab E Nook, Samsung Galaxy Tab E Lite, Samsung Kids – Powered by Galaxy Tab E Lite, and the Samsung Galaxy View and cell phones and tablet products with similar relevant functionality (collectively, “'897 Accused Products”).

148. For example, Samsung has directly infringed and continues to directly infringe claim 1 of the '897 patent and other claims that depend from claim 1, literally or under the doctrine of equivalents, by making, using, selling, and/or offering to sell in the United States and importing into the United States without authority at least the '897 Accused Products.

149. As described below, the '897 Accused Products perform a “method of acquiring an improved image based on tracking a face in a preview image stream.” The '897 Accused Products each perform a method “with a digital image acquisition device” containing a “processor.” For example, the Galaxy S8 contains a camera and a processor that Samsung programs as described below, both of which are used in conjunction with '897 Accused Products.

150. The '897 Accused Products receive “a preview image stream.” For example, when the Camera application is run in connection with each '897 Accused Product, the image sensor captures a stream of preview images, and those preview images are displayed on the device's screen.

151. The '897 Accused Products “determin[e] an initial location or size, or both, of a face in a first preview image of a preview image stream.” For example, when the Camera application is run in connection with the '897 Accused Products and the camera is pointed at a human face, place yellow circled over one or more regions of an image in the preview stream when those regions contain a face.

152. The '897 Accused Products “determin[e] a subsequent location or size, or both, for the same face in a subsequent preview image.” For example, when the Camera application is run in connection with the '897 Accused Products and the camera is pointed at a face, the yellow circle surrounding the face follows the face through a subsequent frame when the face moves within the camera's field of view.

153. On information and belief, “based on the initial and subsequent locations or sizes, or combinations thereof” of the face regions detected in the initial and subsequent images of the preview stream, the '897 Accused Products “predict[] a region of a third preview image which has just been acquired within which region the same face is expected to occur again.” For example, when the Camera application is run in connection with the '897 Accused Products and the camera is pointed at a face, the yellow circle surrounding the face follows the face through a third frame when the face moves within the camera's field of view, indicating that the '897 Accused Product has predicted a region of this preview image where the same face is expected to occur.

154. On information and belief, the '897 Accused Products “analyz[e] one or more characteristics of said region of said third preview image.” On information and belief, the '897 Accused Products detect a face in the region of the third preview image and analyzes the region to determine whether adjustments must be made to the focus position of the lens in the camera associated with the '897 Accused Product and the exposure time to be used for the camera associated with the '897 Accused Product.

155. On information and belief, “based on the analyzing of the one or more characteristics of said region,” the '897 Accused Products “adjust[] one or more acquisition parameters of a main acquired image.” Before capturing a main acquired image when a user presses the shutter button, the '897 Accused Products adjust the focus position of the lens in the camera associated with the '897 Accused Product and the exposure time to be used for the camera associated with the '897 Accused Product as necessary based on the analysis of the characteristics of the region of the third preview image predicted to contain a face.

156. Conventional acquisition-parameter-adjustment technology was incapable of tracking faces and adjusting acquisition parameters accordingly. Even if prior art disclosing tracking were considered conventional, prior-art tracking methods were too processor-intensive to be performed by the camera itself—resulting in a process that was either too slow or of unacceptably low quality to be useful in practical application to a resource-constrained environment such as a portable camera or mobile phone. *See, e.g.*, '897 patent at 2:14-3:16 (distinguishing prior art algorithms and references). A photographer using a conventional camera to manually adjust acquisition parameters could not have performed the claimed processes, which require making decisions based on “image streams,” tracking faces by determining the “size” and “location” of a face based on a discrete series of “preview images,”

predicting future size and location based on such “preview images,” or continuously adjusting parameters in real time.

157. The specification of the ’897 patent expressly describes numerous “[d]isadvantages of the processes described by” an exemplary reference. ’897 patent at 3:1. For example, the specification explains that any method disclosed in this reference “is actually quite unreliable” because it uses a face algorithm based on color matching; takes too much processing time (up to 1 second) to be “compatible” with “state-of-art camera[s]” (which must operate at speeds of 20-30 *milliseconds*); applies processing to an “entire scene” and the “entire frame” before continuing; and cannot “constantly” adjust parameters in real time because it is dependent on user activation. *Id.* at 2:54-57, 3:2-16.

158. The claimed invention of the ’897 patent solves those problems and others, improving computer and digital-processing technology by allowing those processes to be performed more efficiently and effectively in a resource-constrained environment in real time. *See, e.g., id.* at 1:30-31 (“invention provides improved real-time face tracking in a digital image acquisition device”). To do that, it provides specific technological improvements such as tracking the location or size of a face in two images of a “preview image stream” to predict the “region” where the face will appear in a third image, analyzing the region’s characteristics, and adjusting the parameters of the final “acquired image.”

159. The claims also include predicting the size and location of a face, requirements for the relative resolutions of the preview and main acquired images, applying different subsets of face detection windows to different subsets of integral images, merging sets of candidate face regions, variable or fixed sized face detection, checking rejected face regions, applying a cascade of Haar classifiers, and rectangular face detection windows. Requirements for the relative

resolutions of the preview and main acquired image can allow for more efficient processing on lower-resolution images. Applying different subsets of face detection windows to different subsets of integral images, applying a cascade of Haar classifiers, and applying rectangular face detection windows provide a particularly processor-efficient type of face detection and/or tracking that more efficiently uses the architecture of a portable device. Merging sets of candidate face regions and using variable or fixed size face detection creates additional processing efficiencies by allowing accurate face detection with more flexibility in the selection of face-detection windows. In each claim, the claimed steps in combination further provide an unconventional method for tracking a face in specific, resource-efficient ways that represent a technological advance.

160. The U.S. Patent and Trademark Office examiner who reviewed the application that led to the '897 patent explicitly considered all claims allowable under 35 U.S.C. § 101—rejecting some claims under § 101 and then ultimately allowing all claims after modifications to the rejected claims. U.S. Patent App. No. 12/479,593, Non-Final Rejection, 1-6 (June 3, 2010), Notice of Allowability, 1-3 (Jan. 3, 2011).

161. In each claim, the claimed steps in combination are unconventional for the additional reasons that they provide a method for tracking a face in specific, resource-efficient ways that represent a technological advance.

162. By at least July 13, 2015, FotoNation provided Samsung a presentation entitled “face patents overview” that detailed some of the various technologies included in its patent portfolio, including an explicit identification of “Device Acquisition Enhancement” as a technology that “16 patents” in its portfolio addressed. Samsung additionally has notice of the '897 patent and the '897 Accused Products' infringement as of the date of service of this

Complaint. Thus, based on FotoNation's disclosure of the '897 patent to Samsung and the fact that discussions regarding the '897 patent occurred, Samsung has had knowledge of the '897 patent and that its activities infringe the '897 patent, should have known of these facts, and/or willfully blinded itself to these facts since at least July 13, 2015. Additionally, based on FotoNation's disclosures to Samsung and the fact that discussions regarding the '897 patent occurred, by at least July 13, 2015, Samsung has also known, should have known, and/or willfully blinded itself to the fact that its customers, distributors, importers, and other purchasers and users of the '897 Accused Products are infringing the '897 patent.

163. Samsung also actively, knowingly, and intentionally induces infringement of one or more claims of the '897 patent under 35 U.S.C. § 271(b) by actively encouraging others to use '897 Accused Products, or products containing infringing components in the '897 Accused Products, in this judicial district and elsewhere in the United States. Additionally, Samsung actively, knowingly, and intentionally induces infringement of one or more claims of the '897 patent under 35 U.S.C. § 271(b) by actively encouraging others, including but not limited to the purchasers or users of the '897 Accused Products, to use the face-tracking-based image acquisition enhancement features of the '897 Accused Products in a way that directly infringes one or more claims of the '897 patent. For example, Samsung actively promotes the use of its infringing face detection software and hardware and associated software and hardware for cell phones and tablets, and specifically promotes the use of infringing face-tracking-based image acquisition enhancement features of the '897 Accused Products, in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.samsung.com, specifically at www.samsung.com/global/galaxy/galaxy-s8/camera/ (last visited Sept. 26, 2017)), press releases (such as the press release available at news.samsung.com/global/in-depth-look-

fast-fun-and-in-focus-the-galaxy-s8-camera (Mar. 30, 2017)), and user manuals, as well as at trade shows (e.g., CES and Mobile World Congress) and through its sales and distribution channels that encourage infringing uses, sales, offers for sale, and importation of the '897 Accused Products or products containing infringing components, and specifically encourages uses by others, including users or purchasers of the '897 Accused Products, in a way that directly infringes the '897 patent.

164. Samsung further actively, knowingly, and intentionally contributorily infringes one or more method claims of the '897 patent under 35 U.S.C. § 271(c) by knowingly making, selling, and/or offering to sell in the United States, and/or importing into the United States the '897 Accused Products that contain face detection software and hardware and associated software and hardware that are especially made or especially adapted for practicing the method claims of the '897 patent and that are not a staple article or commodity of commerce suitable for substantial non-infringing use, in violation of 35 U.S.C. § 271(c). For example, the '897 Accused Products include hardware and software components that are especially adapted to practicing the method claims of the '897 patent that are not suitable for substantial non-infringing use. Others, including users or purchasers of the '897 Accused Products, use face-tracking-based image acquisition enhancement features of the '897 Accused Products in a way that directly infringes the '897 patent.

165. Based solely on FotoNation's own information and independent investigation without reliance on any information provided by Samsung, Samsung has continued to use the '897 Accused Products in the United States and/or indirectly infringe the '897 patent despite its knowledge of the '897 patent, its infringement of that patent, and its customers' infringement of that patent. Samsung's direct and indirect infringement has been and continues to be willful.

166. Plaintiff has suffered and continues to suffer damages as a result of Samsung's infringement of the '897 patent.

COUNT VIII
INFRINGEMENT OF THE '932 PATENT

167. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 127 as though fully set forth herein.

168. Samsung has infringed and continues to infringe one or more claims of the '932 patent, directly or indirectly, literally or under the doctrine of equivalents, by making, using, selling, and/or offering to sell in the United States and importing into the United States without authority at least the face detection software and hardware, beauty face software and hardware, and the associated software and hardware for the Galaxy S8, Galaxy S8+, Galaxy S7, Galaxy S7 Edge, Galaxy S6, Galaxy J3, Galaxy J3 Emerge, Galaxy Note 8, Galaxy Tab S2, Galaxy Tab S3, Galaxy Tab A, Galaxy Tab A With S Pen, Galaxy Tab E, Galaxy View, Galaxy Tab E Lite, Samsung Kids Powered by Galaxy Tab E Lite, Galaxy S6 Edge, Galaxy S6 Active, Galaxy Note 5, Galaxy S7 Active, Galaxy J7, Galaxy Tab E Nook, and cell phones and tablet products with similar relevant functionality (collectively, "'932 Accused Products").

169. For example, Samsung has directly infringed and continues to directly infringe claim 13 of the '932 patent and other claims that depend from claim 13, literally or under the doctrine of equivalents, by using in the United States without authority at least the '932 Accused Products.

170. The '932 Accused Products include "[o]ne or more non-transitory digital storage devices having embodied therein program instructions for programming one or more processors." For example, each Galaxy S8 contains a processor that is programmed to perform a method as described below.

171. The '932 Accused Products “perform a method of processing a digital image using face detection to achieve one or more desired image processing parameters.” For example, in the '932 Accused Products, photo editing options such as Bright Face, Soften Face, and Spotlight each contain sliders whose value can be adjusted upward from zero. These photo editing options are only available when a face has been detected in an image.

172. The '932 Accused Products “identify[] a group of pixels that correspond to a face image within the digital image.” For example, the '932 Accused Products contain a Camera application. When the Camera application is run and the camera on the '932 Accused Product is pointed at a human face, the Accused Product surrounds the face with a yellow circle. As another example, when an image including a face is loaded in the Gallery application of a '932 Accused Product, a yellow circle surrounds the face.

173. The '932 Accused Products perform “generating in-camera, capturing or otherwise obtaining in-camera a stream of images including said face image.” For example, when the Camera application on each '932 Accused Product is run and the camera is pointed at a human face, the image sensor captures images including said face.

174. The '932 Accused Products “track[] said face image within said stream of images.” For example, when the Camera application on each '932 Accused Product is run, as the face moves across the field of view of the camera, the yellow circle remains located on the face.

175. On information and belief, the '932 Accused Products perform “detecting a skin tone for the face image by determining one or more color or tonal values, or combinations thereof, for the group of pixels and comparing with one or more default color or tonal values, or combinations thereof.” For instance, when the value of the Skin Tone, Spotlight, or Bright Face

sliders are increased in the '932 Accused Products, the image is correspondingly adjusted to add a skin tone, spotlight, or brighten effect to the face. When this adjustment is performed, the effect is concentrated in the skin region of the face.

176. On information and belief, the '932 Accused Products “adjust[] values of one or more parameters for the group of pixels, including adjusting a luminance of each face image separately depending on the skin tone of each face image.” For example, on information and belief, when there are multiple faces in a digital image, the Skin Tone feature of the '932 Accused Products adds a skin tone effect including a luminance adjustment to each face separately, whereby the amount of the skin tone effect depends at least on the skin tone of the face.

177. Conventional methods and systems for digital image processing did not apply a fill flash in an amount based on a detected face's skin tone. Nor did they use detection and knowledge of faces in images to create and/or use tools for the enhancement or correction of the images. *See* '932 patent at 2:5-8. As the specification explains, conventional methods and systems were especially inadequate for group photos with people belonging to different ethnic groups. *See* '932 patent at 23:28-33, figs. 4i-4l. The claimed invention improved on computer and digital-processing technology by, among other things, detecting a face, tracking the face, detecting a skin tone for the face, and adjusting a luminance of the face depending on the skin tone. The method taught by the '932 patent produces images of better quality especially for group photos with people belonging to different ethnic groups. The claimed “tracking” does not include a photographer moving the camera to follow something of interest. This claimed tracking significantly increased autofocus accuracy and efficiency over conventional methods.

178. The dependent claims further require details that improve the functioning of providing a fill flash, including, for example, selectively applying a fill-flash to regions within the face image in an amount based on the detected skin tone to open up shadows within the face image, repeating the identifying, detecting, and adjusting for a second face image having a different skin tone than the first face image, and applying a fill-flash to the two face images in different relative amounts depending on the different skin tones. The '932 patent claims advance technology because, for example, it produces images of better quality especially for group photos with people belonging to different ethnic groups.

179. In each claim, the claimed steps in combination are unconventional, improve computer / digital processing technology, and solve problems in that field, producing better quality images.

180. By at least July 13, 2015, FotoNation provided Samsung a presentation entitled "face patents overview" that detailed some of the various technologies included in its patent portfolio, including an explicit identification of "Adjust Color / Luminance" as a technology that "15 patents" in its portfolio addressed. Samsung additionally has notice of the '932 patent and the '932 Accused Products' infringement as of the date of service of this Complaint. Thus, based on FotoNation's disclosure of the '932 patent to Samsung and the fact that discussions regarding the '932 patent occurred, Samsung has had knowledge of the '932 patent and that its activities infringe the '932 patent, should have known of these facts, and/or willfully blinded itself to these facts since at least July 13, 2015. Additionally, based on FotoNation's disclosures to Samsung and the fact that discussions regarding the '932 patent occurred, by at least July 13, 2015, Samsung has also known, should have known, and/or willfully blinded itself to the fact that its

customers, distributors, importers, and other purchasers and users of the '932 Accused Products are infringing the '932 patent.

181. Samsung also actively, knowingly, and intentionally induces infringement of one or more claims of the '932 patent under 35 U.S.C. § 271(b) by actively encouraging others to use '932 Accused Products, or products containing infringing components in the '932 Accused Products, in this judicial district and elsewhere in the United States. Additionally, Samsung actively, knowingly, and intentionally induces infringement of one or more claims of the '932 patent under 35 U.S.C. § 271(b) by actively encouraging others, including but not limited to the purchasers or users of the '932 Accused Products, to use the face-tracking-based beauty face features of the '932 Accused Products in a way that directly infringes one or more claims of the '932 patent. For example, Samsung actively promotes the use of its infringing face detection software and hardware, beauty face software and hardware, and the associated software and hardware for the cell phones and tablets, and specifically promotes the use of infringing face-tracking-based beauty face features of the '932 Accused Products, in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.samsung.com, specifically at www.samsung.com/global/galaxy/galaxy-s8/camera/ (last visited Sept. 26, 2017); <http://www.samsung.com/us/support/answer/ANS00042214/> (last visited Sept. 26, 2017)), press releases, and user manuals, as well as at trade shows (e.g., CES and Mobile World Congress) and through its sales and distribution channels that encourage infringing uses, sales, offers for sale, and importation of the '932 Accused Products or products containing infringing components, and specifically encourages uses by others, including users or purchasers of the '932 Accused Products, in a way that directly infringes the '932 patent.

182. Samsung further actively, knowingly, and intentionally contributorily infringes one or more method claims of the '932 patent under 35 U.S.C. § 271(c) by knowingly making, selling, and/or offering to sell in the United States, and/or importing into the United States the '932 Accused Products that contain components that are especially made or especially adapted for practicing the method claims of the '932 patent and that are not a staple article or commodity of commerce suitable for substantial non-infringing use, in violation of 35 U.S.C. § 271(c). For example, the '932 Accused Products include face detection software and hardware, beauty face software and hardware, and the associated software and hardware components that are especially adapted to practicing the method claims of the '932 patent that are not suitable for substantial non-infringing use. Others, including users or purchasers of the '932 Accused Products, use face-tracking-based beauty face features of the '932 Accused Products in a way that directly infringes the '932 patent.

183. Based solely on FotoNation's own information and independent investigation without reliance on any information provided by Samsung, Samsung has continued to use the '932 Accused Products in the United States and/or indirectly infringe the '932 patent despite its knowledge of the '932 patent, its infringement of that patent, and its customers' infringement of that patent. Samsung's direct and indirect infringement has been and continues to be willful.

184. Plaintiff has suffered and continues to suffer damages as a result of Samsung's infringement of the '932 patent.

JURY DEMAND

185. Plaintiff demands a jury trial as to all issues that are triable by a jury in this action.

PRAYER FOR RELIEF

186. WHEREFORE, Plaintiff respectfully prays for relief as follows:

(a) Judgment that each defendant is liable for infringement, and/or inducing the infringement, and/or contributing to the infringement of one or more claims of each of the Asserted Patents, as alleged herein;

(b) A permanent injunction barring continued infringement, inducement of infringement, and/or contribution to infringement by each defendant and its parents, subsidiaries, affiliates, successors, predecessors, assigns, and the officers, directors, agents, servants, and employees of each of the foregoing, customers and/or licensees and those people acting in concert or participation with any of them.

(c) Compensatory damages in an amount according to proof, and in any event no less than a reasonable royalty;

(d) Treble damages for willful infringement pursuant to 35 U.S.C. § 284;

(e) An award of attorneys' fees based on this being an exceptional case pursuant to 35 U.S.C. § 285, including pre-judgment interest on such fees;

(f) Pre-judgment interest;

(g) Post-judgment interest;

(h) An accounting and/or supplemental damages for all damages occurring after any discovery cutoff and through final judgment;

(i) Costs and expenses in this action; and

(j) An award of any further relief that this Court deems just and proper.

Dated: March 16, 2018

/s/ Julie M. Holloway

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that counsel of record who are deemed to have consented to electronic services are being served with a copy of this document via the Court's CM/ECF system per Local Rule CV-5(a)(3) on this the 16th day of March, 2018.

/s/ Julie M. Holloway

Julie M. Holloway